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On a New Guatemalan *Pseudocellus* (Arachnida, Ricinulei)

NORMAN I. PLATNICK[1] AND GÜNTHER PASS[2]

ABSTRACT

A new species, *Pseudocellus seacus,* is described from central Guatemala, and observations on its habitat, abundance, and feeding behavior are recorded.

INTRODUCTION

This paper, the seventh in a series on the arachnid order Ricinulei, is devoted to the description of a new species of *Pseudocellus* from Guatemala and an account of its natural history. Only two species of ricinuleids have previously been described from Guatemala. The first, *Cryptocellus barberi* Ewing (1929) from Livingston, Departamento Izabel, was based exclusively on nymphal material. Although examination of the holotype indicates that it actually belongs to the genus *Pseudocellus* Platnick (1980), the specific identity and relationships of the taxon will remain uncertain until topotypical adult specimens become available, and the name is best regarded as a *nomen dubium.* The second species, *Cryptocellus cookei* Gertsch (1978), known only from males taken in a cave in Departamento El Petén, is also actually a member of *Pseudocellus,* but is readily discernible from the species described below from material of both sexes taken near Cobán, Departamento Alta Verapaz.

Our knowledge of Central American *Pseudocellus* species is still very fragmentary; none of the five previously described species are known from both sexes. Because additional new taxa will be described subsequently in this series, it seems best to postpone a discussion of the affinities of the new Guatemalan species until a broader sample of the diversity of the group is available for comparison.

We are deeply indebted to Dr. G. Kramer for collecting and making available most of the specimens discussed below, to Dr. M. U. Shadab for help with illustrations, and to Dr. G. Legg for commenting on a draft of the manuscript. All measurements are in millimeters.

[1] Associate Curator, Department of Entomology, American Museum of Natural History; Adjunct Professor, Department of Biology, City College, City University of New York.
[2] Institut für Zoologie der Universität Wien, Dr. Karl Lueger-Ring 1, A-1010 Vienna, Austria.

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NATURAL HISTORY

The specimens described below were collected from soil and litter in a primary rain forest at an elevation of 700–1000 m. in central Guatemala, close to the Finca Seacté near Cobán. The habitat is a forest rich in oaks within the Tierra Templada (Knapp, 1965) and is transitional between tropical lowland, tropical montane, and subtropical forests in climate, flora, and fauna. Several layers can be distinguished in the soil profile: (1) the uppermost layer containing entire leaves; (2) below this a layer of leaf fragments, then (3) a humus layer (1–3 cm. thick), followed by (4) a clay layer (0–4 m. thick) underlain by limestone rocks. Kramer (1978) studied litter decomposition at this locality with special attention to the meso- and macrofauna. She took samples of the upper soil layers (4000 cm^2 each) from which the animals were carefully sorted out by hand. Sampling took place once a month from March 1975 to March 1976, with three samples taken six times a day. The average abundance found by this method (in which at least larger nymphs and adults could not be overlooked) was 0.4 individuals/m^2 (standard error = 0.08). This abundance figure is less than that found by Dr. Gerald Legg for *Ricinoides hanseni* Legg in Sierra Leone, where specimens extracted by modified Tullgren funnels from separate monthly samples of litter, humus, and soil totaled 0.5 to 16 individuals/m^2 (standard error = 0.05) over a year (G. Legg, *in litt.*).

Specimens were kept in captivity at room temperature in small plastic boxes, equipped with a bottom of plaster mixed with active charcoal, in which the animals could be easily observed. By moistening the bottom, the necessary high humidity was guaranteed. However, the animals do not tolerate completely wet ground for long; they become increasingly turgid and die within a few days, as was reported by Cooke (1967) for *Cryptocellus lampeli.* The boxes contained a small piece of tree bark affording a place for retirement. The ricinuleids were fed 20–50 nematode worms (*Rhabditis* sp.) once a week. Under these conditions some tritonymphs lived up to 14 months, but no molting of juvenile instars occurred. Even when kept in their natural litter and humus substrate for five months at higher temperatures (25°C.), molting could not be initiated.

Few data exist concerning the food and feeding behavior of ricinuleids (Cooke, 1967, and listed references; Pollock, 1967; Mitchell, 1970). Most species are predators capturing various small soft-skinned animals. However, the cave-dwelling *Pseudocellus pelaezi* (Coronado) has been reported to feed not only on living animals, but also "upon the dead bodies of bats, crickets, amblypygids, and millipedes and upon the feces of bats and millipedes" (Mitchell, 1970, p. 74).

To determine the spectrum of prey captured by tritonymphs and adults of *Pseudocellus seacus,* single specimens were kept in boxes together with different small animals for at least 14 days and observed daily. The living prey offered were: nematodes (*Rhabditis* sp.), enchytraeid annelids of different sizes, oribatid mites, mesostigmatid mites (*Macrocheles* sp.), different collembolans (*Heteromurus nitidus, Orchesella* sp.), small staphylinid beetles, young pseudoscorpions, and the larvae and wingless adults of *Drosophila.* The nematodes, small enchytraeids, and *Drosophila* larvae were the only prey accepted; the other animals were obviously neglected because of their greater mobility. This is in contrast to observations that other ricinuleid species can capture such relatively quickly moving prey as small termites (*Cryptocellus lampeli*: Cooke, 1967; *Ricinoides afzelii*: Pollock, 1967).

For prey detection, the extensive and morphologically well-differentiated sensilla complex on the distal parts of the first and especially second leg pairs (Pittard and Mitchell, 1972) may be of special importance. The second legs seem to be functional antennae, as they were often not used for locomotion but carried horizontally, making palpating up and down movements while touching the ground only from time to time. In addition to mechanical and contact chemoreception, olfactory stimuli are also obviously relevant in prey detection. When freshly killed and opened larvae of *Drosophila* were offered, feeding behavior was induced without the prey being touched: the pedipalps were low-

ered, picking somewhat randomly at the ground.

When the pedipalps contact prey, it is caught by the chelae, lifted to the preoral cavity, taken over by the chelicerae, and held there tightly with the help of the lowered cucullus. The pedipalps function as a claw much as in scorpions, pseudoscorpions, and uropygids, despite the fact that the chelae of the pedipalps are much smaller than those of the chelicerae. Cooke (1967) reported that in *Cryptocellus lampeli* the cucullus helps to capture prey by grasping the head of a termite while the pedipalps obtain a hold elsewhere on the body.

In the preoral cavity the prey is first reduced to a pulp by the alternately protruding and pinching chelicerae, assisted by movements of the cucullus, as observed in other ricinuleids (Cooke, 1967; Pollock, 1967). Sometimes, especially if larger prey is accepted, the pedipalps aid in stuffing material into the preoral cavity. Part of a large prey item may be torn off by the pedipalps and deposited on the ground to be taken up later. After having completely crushed the prey, the animals remain immobile for a long time while engaged in extraintestinal digestion. From time to time, the liquefied pulp is sucked up and an obviously digestive secretion discharged again into the preoral cavity. Finally, indigestible remains are dropped, as observed especially after the animals fed on large fly larvae. Digestion of a larval *Drosophila* required about 40 minutes.

Once an extended orange-brownish, microscopically structureless mass of feces was observed protruding from the anus of a tritonymph. In *Ricinoides afzelii,* however, Pollock (1967) noticed assumed defecation in a nymph that actually squirted out a fine spray of liquid from the anus backward for about 2 or 3 centimeters. He argued that this action may have a defensive function in addition to its excretory one.

Single specimens were observed nipping with their chelicerae into plasticine or gnawing tree bark into small pieces. Perhaps these appendages, like the pedipalps, function also in digging or in exposing prey hidden in small clefts or cracks of the substrate.

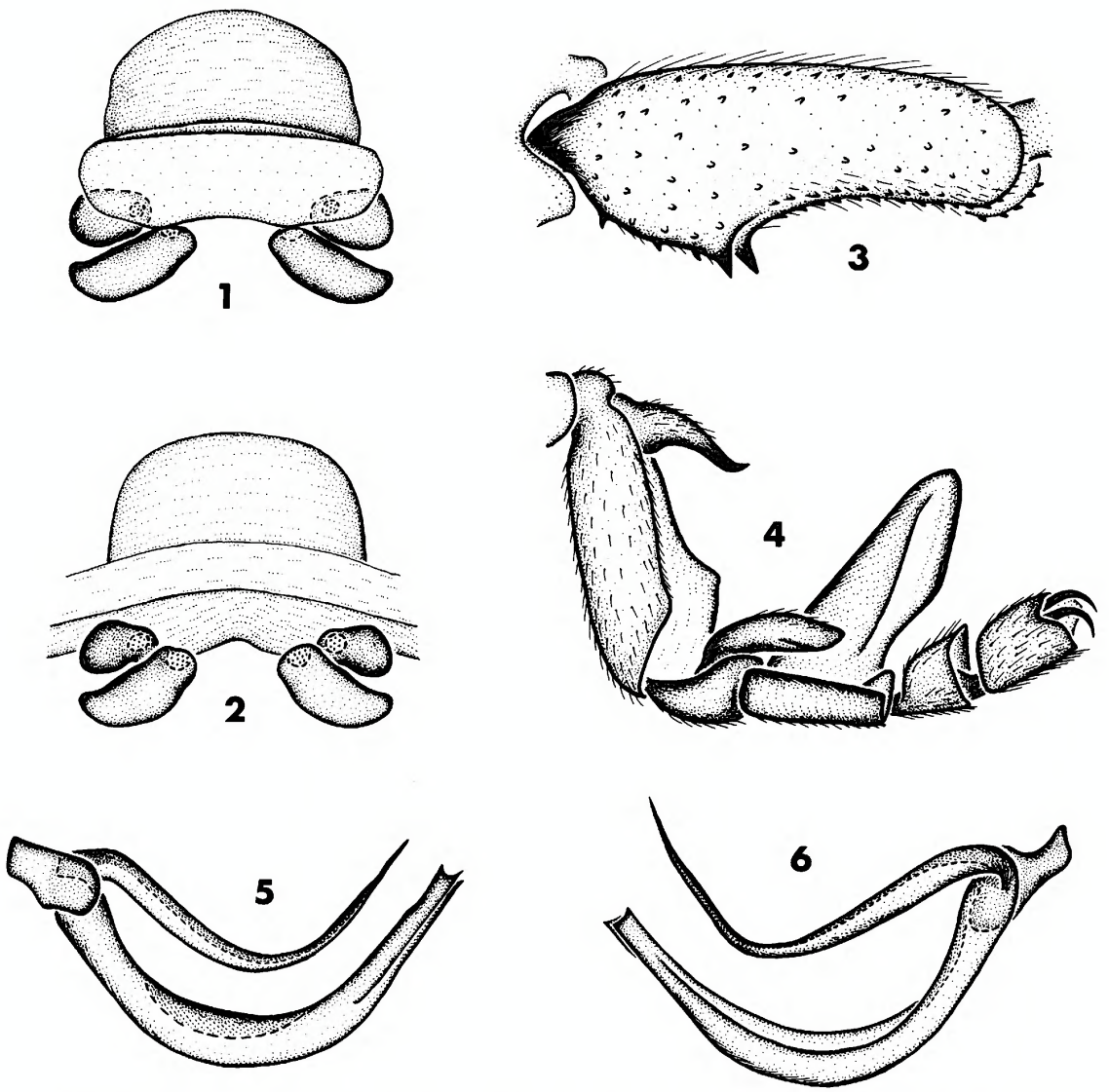
Pseudocellus seacus, new species
Figures 1–6

TYPES: Male holotype and female paratype from Finca Seacté, near Cobán, Alta Verapaz, Guatemala (March 1975–August 1976; G. Kramer and G. Pass), deposited in the American Museum of Natural History.

ETYMOLOGY: The specific name is an arbitrary combination of letters.

DIAGNOSIS: The triple-pointed tip of the male tarsal process (figs. 5, 6) and the small lateral and elongate median female spermathecae (figs. 1, 2) are both diagnostic. The species can be distinguished from others occurring in adjacent regions (Chiapas and Yucatán, Mexico, and Central America) as follows: males can be distinguished from those of *P. cookei* (Gertsch) and *P. bolivari* (Gertsch) by having clasping spines on tibia II (fig. 3), from those of *P. sbordonii* (Brignoli) by having much shorter legs (with femur II, for example, shorter than the carapace as opposed to more than twice its length), and from *P. pearsei* (Chamberlin and Ivie) by having the tips of the tarsal process equal in length (compare figs. 5, 6 with Gertsch, 1978, figs. 12, 13); females can be distinguished from those of *P. dissimulans* (Cooke and Shadab), *P. relictus* (Chamberlin and Ivie), and *P. spinotibialis* (Goodnight and Goodnight) by having the median plates of all tergites wider than long, from those of *P. blesti* (Merrett) by having four spermathecae, from those of *P. bolivari* (Gertsch) by having much shorter legs (with leg I, for example, shorter than the total length rather than one and one-quarter times the total length), and from those of *P. pearsei* (Chamberlin and Ivie) by having the spermathecae in dorsoventral pairs rather than a transverse row (compare figs. 1, 2 with Gertsch, 1978, fig. 7).

FEMALE: Total length, excluding pygidium, 3.74. Carapace 1.38 long, 1.48 wide near rear of coxae II, where widest, dark red with anterior and posterior margins darkest and long, creamy yellow translucent areas at lateral margins extending from anterior margin back to two-thirds of carapace length; surface coated with long white setae, with tubercles along midline and in two procurved rows on



FIGS. 1–6. *Pseudocellus seacus,* new species. 1. Posterior genital lip and spermathecae, anterior view. 2. Posterior genital lip and spermathecae, posterior view. 3. Left tibia II of male, anterior view. 4. Left metatarsus and tarsus III of male, anterior view, with tarsal process removed. 5. Left tarsal process, anterior view. 6. Left tarsal process, posterior view.

posterior one-third. Cucullus 0.61 long, 0.86 wide, dark red proximally, lighter distally, with white setae densest and longest distally and few tubercles along midline, curved lateral depressions, and distal margin; lateral lobes moderately protuberant. Left chelicera: movable finger concave posteriorly, not widened transversely, armed with six teeth of which most proximal is much the largest, others subequal; fixed finger armed with five teeth of which most distal is much the largest, others subequal. Sternal region with coxae I not meeting tritosternum; coxae II meeting along their posterior three-quarters, their su-

ture line about one-third longer than that of coxae III; coxae IV meeting along their length. Abdomen 2.54 long, 2.04 wide near front of tergite 12, where widest, coloration and setation as in carapace except for orange articular membranes, with tubercles restricted to paired lateral excavations of median plates (extending the length of tergites 11–13), unpaired lateral depressions near inner margin of lateral plates of all tergites, corresponding sternite depressions near front of sternites 11–13, and anterior margins of sternites 10 and 11; median plates of all tergites wider than long. Pygidium without notch in posterior dorsal or ventral margin of basal segment. Palpal coxae light red, other segments orange; trochanters with few ventral tubercles, other segments unarmed; coxae each with two thick white setae posteriorly along inner margin. Leg formula 2431. Legs light red proximally, orange distally, with second pair darkest, coated with long white setae, with scattered tubercles densest on metatarsi. Measurements:

	I	II	III	IV	Palp
Coxa	0.48	0.79	0.64	0.47	0.25
Trochanter I	0.25	0.45	0.36	0.47	0.37
Trochanter II	—	—	0.38	0.37	0.28
Femur	0.74	1.25	0.84	0.95	0.72
Patella	0.46	0.66	0.46	0.50	—
Tibia	0.63	1.02	0.59	0.60	1.08
Metatarsus	0.79	1.08	0.63	0.72	—
Tarsus	0.37	1.22	0.66	0.70	0.14
Total	3.72	6.47	4.56	4.78	2.84

Second legs widened; femur I about three times, femur II about three and one-half times as long as wide. Tarsal claws thin, evenly curved. Posterior genital lip and spermathecae as in figures 1, 2.

MALE: As in female except for the following: Total length, excluding pygidium, 3.67. Carapace 1.42 long, 1.40 wide near front of coxae III, where widest. Cucullus 0.61 long, 0.86 wide. Left chelicera: fixed finger with additional denticle proximal to tooth row. Sternal region with suture line of coxae II twice as long as that of coxae III. Abdomen 2.58 long, 1.94 wide. Leg formula 2341. Measurements:

	I	II	III	IV	Palp
Coxa	0.50	0.81	0.64	0.47	0.25
Trochanter I	0.31	0.52	0.40	0.41	0.36
Trochanter II	—	—	0.45	0.40	0.29
Femur	0.79	1.25	0.94	0.99	0.72
Patella	0.38	0.73	0.53	0.52	—
Tibia	0.67	1.14	0.61	0.65	0.97
Metatarsus	0.83	1.21	0.73	0.73	—
Tarsus	0.32	1.33	0.94	0.77	0.14
Total	3.80	6.99	5.24	4.94	2.73

Femur II about three times as long as wide. Tibia II with pair of anterolateral clasping spines (fig. 3). Tarsal process with three distal points, accessory piece narrowed distally (figs. 5, 6); first tarsomere elongated (fig. 4).

MATERIAL EXAMINED: Two males, three females, nine tritonymphs, one deutonymph, and one protonymph taken with the types.

DISTRIBUTION: Known only from the type locality.

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